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Review

Consolidating Human-AI Collaboration Research in Organizations: A Literature Review

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Abstract: The purpose of this study is to depict the value added by human-AI collaboration in organizations to collaboration system design by virtue of the studies reached by the literature review on different databases are examined. Web of Science content and covering the title of "human-AI collaboration" has been selected in this study. Research using bibliometric analysis has been conducted and it has been determined that the terms "human-AI collaboration" and "generative artificial intelligence" should be searched for simultaneously in each and every article published in the journal between the years 1975 and 2024. Our study used a combination of bibliometric analysis and literature review, bibliometric analysis tools include HistCite and CiteSpace. The citation map shows three phases: human-machine collaboration into practice (before 2020), the intelligent and automated segment of AI (2020-2021), and the generative AI phase represented by ChatGPT (2022 to present). This article conducted a systematic overview study on human-AI collaboration in organizations, established a conceptual framework for the conceptual framework of human-machine collaboration guided by generative AI integration, and provided certain theoretical insights to guide the corresponding practical activities. Bibliometric analysis is a method that can be used to evaluate the performance of a research topic. However, it is important to note that bibliometric analysis has some limitations when it comes to assessing the validity of a single theme. This circumstance is elaborately described as a limitation of this study. This article builds on data from WoS Core Collection, and some new but important articles may not be analyzed, since bibliometrics consider high citation as an indicator to select influential articles. while previous research focused on researching modes of collaboration between humans and cobats, such as virtual assistants, this study extends the literature on different types of AI. Our research addresses the emerging field of collaboration with software that is not just a mere tool designed for performing knowledge work but becomes a collaborative partner.

Keywords: human-AI collaboration; generative artificial intelligence; systematic review; organizational change; industry 5.0

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1. Introduction

Artificial intelligence (AI) technology is used increasingly in various fields, and working with humans is an area of concern. Due to advancements in algorithms, combined with enhanced processing capabilities and the proliferation of digital data, corporate managers increasingly render artificial intelligence feasible in ways that were previously unattainable. Robust patterns derived from extensive datasets can generate novel insights and predictions, provided that the existing data exhibits reasonable predictive accuracy for future outcomes. AI facilitates this process, especially machine learning algorithms [1]. Today, there is a great deal of interest in the potential for collaboration between humans and artificial intelligence (AI) technologies. With new advancements, smart machines are increasingly integrated into the workplace and society. Humans and smart machines have experienced a transformation from human-machine interaction to

human-machine collaboration [2]. Contemporary AI is based on machine learning techniques that allow computers to learn solutions from data rather than being explicitly programmed [3]. Organizations have begun to explore how to improve management performance by integrating humans and AI, rather than relying on either alone, to address a range of challenges [4]. Scholars have also begun to explore the factors and results that lead to human-AI collaboration [5]. The lean progress of artificial intelligence technology leads to research on human-AI collaboration to be explored more deeply, to discover new application scenarios and technical methods, and realize closer collaboration and interaction between human beings and intelligent systems. For instance, in addition to the collaboration of employees in the organization with traditional intelligent robots, the continuous iteration of large technical models also brings foundation and challenges to all levels of the organization. Generative artificial intelligence (GAI) represents a new generation of artificial intelligence technology, which generates new digital content based on user input prompt words [6].

The Concept of human-AI collaboration first emerged in artificial intelligence (AI) and is now expanding to areas such as organizational management and human resource management (HRM) [7]. Previous studies on human-AI collaboration understood artificial intelligence as intelligent robots, emphasizing that intelligent robots help employees share work so that people can focus time and energy on more complex tasks. Existing literature contains different applications of AI systems in business organizations [8], such as digital assistants (chatbots) developed using machine learning (ML) algorithms to understand the needs of users (through questions), or provide personalized conversational experience [9]; Speech recognition systems augment artificial intelligence, in which artificial intelligence systems augment human decision-making and continuously learn from interactions with humans and environment [10]; Autonomous intelligence is related to self-driving cars and drones, where artificial intelligence systems can adjust themselves and act autonomously without any human involvement [11]. With new advancements, research definition gradually shifted from intelligent robots to large models of artificial intelligence, leading to a new research upsurge in management, discussing how artificial intelligence and human beings cooperate to provide more possibilities for management decision-making and execution. Human-AI collaboration research focuses on a series of factors that promote or inhibit effective human-AI collaboration and determines the outcomes of such collaboration [12], as well as existing research focusing on how beneficial human-AI collaboration can be based on specific scenario conditions. In collaborative decision-making, researchers focus on human-AI cooperation decision-making, aiming to improve the quality and efficiency of decision-making. AI extends human cognition to deal with complexity, while humans can still provide a more comprehensive and intuitive approach to dealing with uncertainty and ambiguity in organizational decisions [13]. Data processing and model analysis capabilities of AI provide important support for human decision makers, and the intelligence of AI playing the role of semi-autonomous decision-makers in complex and increasingly diverse environments rapidly expands [14]. While AI systems support analytical decision-making methods, they are less able to understand common-sense situations [10,15], and compared with humans, less feasible in uncertain or unpredictable environments-especially outside predefined knowledge domains [15]. With respect to workflow optimization, collaboration between people and AI optimizes workflow and improve production efficiency and benefits. Results show that the enterprise application of artificial intelligence technology has a positive impact on carbon emissions. Meanwhile, corporate green innovation reinforces the role of AI in carbon emission reduction [16,17]. AI technology in data processing and analysis and forecasting provides more precise information and decision-making basis for managers. Based on the organizational innovation Angle, a study has shown that the field of organizational innovation management can be achieved more effectively with the aid of artificial intelligence. increasingly organizations rely on AI technology to optimize business processes, improve productivity, and explore new business models. The introduction of AI technology for the

enterprise has brought unprecedented data processing ability and depth of analysis, makeing the enterprise can more accurately predict market trends, optimization of product design, improving customer experience [18]. Managers try to identify and manage new business models around AI technologies in response to increasing market competition [19]. AI's intelligent algorithms and machine learning capabilities help managers discover new business opportunities and management strategies, driving continuous progress of organizations.

Several studies have reviewed the application of service robots in the restaurant industry. Research scholars have also reviewed literature studies on AI in organizations [17,20,21]. However, these studies only focus on certain types of applications of intelligent machines and do not provide GAI technology used in the organization's overall overview and analysis. In addition, human-machine collaboration research in organizations varies greatly in definition, theory, and research perspective. Despite the benefits of AI to automation, process efficiency, increased analytical capabilities, clinical demand forecasting, and human resource decision support are obvious, most organizations do not fully experience the expected value [9,14].The reasons focus on a few areas: i) organizations face difficulties integrating AI systems with existing human workers, processes, and business strategies, caused by differences in technology, culture, or organizational structure, which requires cooperation and adjustment from all aspects within the organization [10]. ii) best practices for effective development cooperation intelligence ability, organization general lack of understanding and professional knowledge. Collaborative intelligence emphasizes effective collaboration and partnership between AI and human intelligence (HI), which requires organizations to have the corresponding knowledge, skills, and resources to support this new way of working [10,22]. iii) although collaborative intelligence is an emerging research field, its potential and value have been widely recognized [22]. However, organizations in the process of achieving this goal, still need to constantly overcome obstacles in aspects of technology and actively explore innovative best practices to realize the organic integration of AI and HI and raise the overall efficiency of the organization and the innovation ability. Human-AI collaborative research in the organizations, therefore, to review the system, and to evaluate in the organization has guiding significance for the status quo of human-AI collaborative research. This research from the Angle of organizations and AI collaboration literature reviewed, to answer the following research questions:

RQ1. What is the current state of the literature regarding human-AI collaboration?

RQ2. What are the concerns of research on human-AI collaboration in organizations? What are the current research hotspots?

RQ3. How to effectively integrate AI systems with employees, processes, and business strategy?

We organize the rest of this article as follow. Section 2 presents the research design of this paper, including the research methods, tools and data collection process. Section 3 presents the general findings of the bibliometric analysis and provides an overview of research on human-AI collaboration in organisations. Section 4 provides further analysis based on HistCite citation mapping, keyword co-occurrence and emergence mapping. Three stages of human-AI collaboration research and the research topics of each stage are identified. Based on the results of the meta-analysis and a thorough reading of the above literature, a conceptual framework for human-AI collaboration in organisations is proposed in Section 5 to guide future research and practice. Finally, the significance of the work, limitations and suggestions for future work are discussed.

2. Methodology

2.1. Literature Search Method

We used a four-step process to search for relevant articles, as shown in the PRISMA flowchart in Figure 1. First, we searched the Web of Science database using a literature

search formula (see box 1 in Figure 1) and limited our results to articles published in the subject areas of business / management and psychology, initial search yielded 3085 articles. Secondly, the paper is screened for journal quality. For ensuring the comprehensiveness of the sample, focusing on work at the micro level, we included articles published in journals ranked 3 or above in business / management as well as in the subject area of psychology (according to the list of Chartered Association of Business Schools Journals). In the third and fourth stages, we manually screened the titles and abstracts of the remaining articles (n = 426) to ensure that they focused strictly on the micro impact of AI in the relevant areas of management, organizational behavior, and organizational psychology (see exclusion criteria in box 3 of Figure 1). After excluding articles outside the study of non-human-machine collaboration or human-AI collaborative work, we included 305 research articles as the final analysis sample for this study.

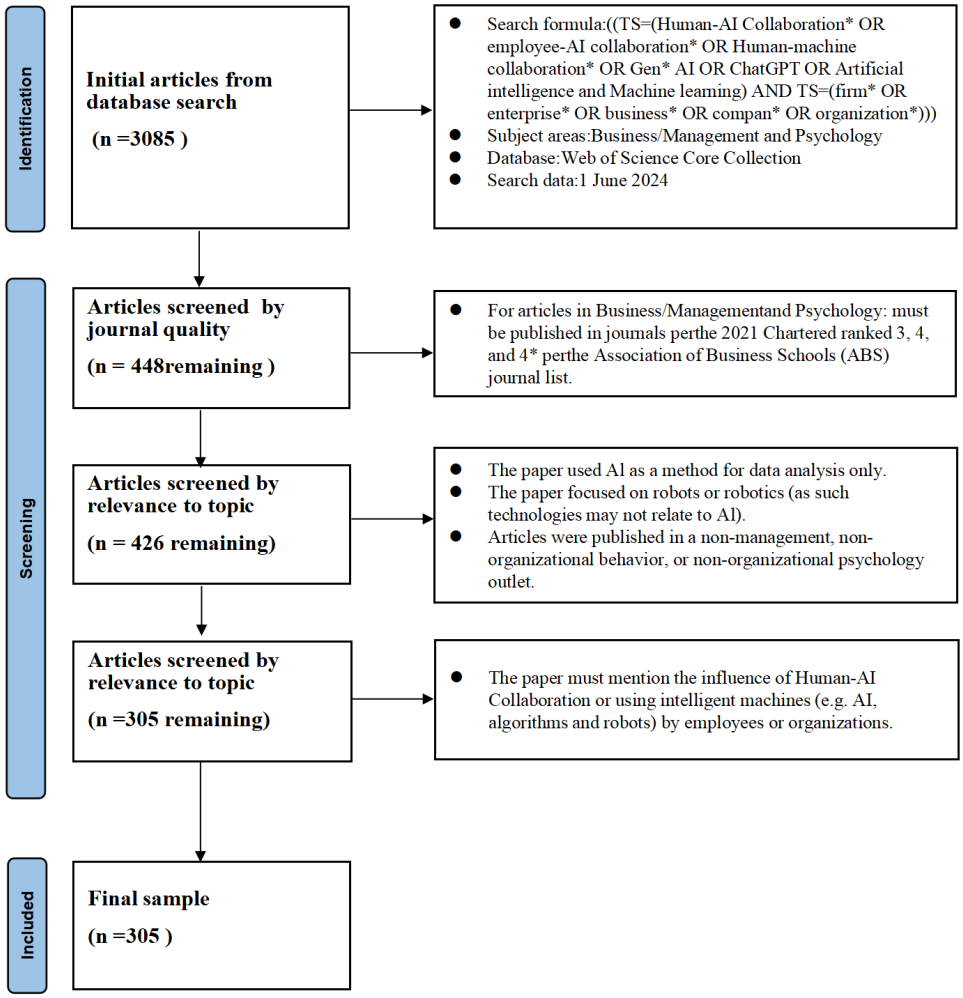

Figure 1. Flow diagram of the search process.

2.1. Literature Analysis Method

Keeping up with the latest developments and understanding the existing knowledge base are essential for making informed decisions in academic and practical Settings [23]. Literature review articles, including structured literature reviews, bibliometric analyses, and meta-analyses, therefore play a key role in facilitating this process [11]. Bibliometric analysis reveals the development direction of research and is popular in economic management research, where it is widely used to analyze the change in research hotspots and trends [17,20,21]. Taking publication information as the research object, this paper uses

the statistical method of bibliometrics analysis to analyze the characteristics of man-machine collaboration in 305 paper samples such as title, author, keywords, journal, year, citation, etc. Bibliometric analysis was performed using HistCite and CiteSpace [24]. As a citation analysis tool, HistCite can quickly draw the development context of a certain research field and lock important literature and scholars in a certain research direction. CiteSpace presents the structure, law, and distribution of scientific knowledge in a visual way. Commonly used features include literature co-citation analysis, keyword co-occurrence analysis, keyword emergence analysis, etc., which are widely used to analyse changes in research hotspots and trends [19].

Firstly, our paper uses research tools to conduct descriptive statistical analysis on the annual publication volume, authors, journals, publishing countries, and research institutions of the obtained literature. Then, we use HistCite to draw citation mapping to determine the relationship between the key literature and literature in human-AI collaborative research in the organization. Reveals the development stage, in the research topic, theoretical basis, and research methods. Keyword co-occurrence mapping and emergent keyword mapping are performed using CiteSpace software to show the hot spots and development trends of this research. Finally, we conducted an in-depth study of 30 highly cited classic articles and references to propose a conceptual framework for human-AI collaborative research in organisations, which could serve as a reference for future research.

3. Analysis of Results

3.1. Activity Indicators

Papers published in the last 5 years are enclosed in parentheses as follows: 2020 (32), 2021 (41), 2022 (62), 2023 (76), and 2024 (74, published as of June 1). We analyzed the number of journal publications and the results are shown in Table 1. 11 journals published more than 5 papers. The largest number of papers were published in *Technological Forecasting and Social Change*, followed by *The Journal of Business Research* and *IEEE Transactions on Engineering Management*. Table 2 shows the cited frequency of the top five articles, ordered by reference number.

Table 1. Journals with the most records (4 or more publications).

Journal	Recs	Impact Factor (2023)
Technological Forecasting and Social Change	23	12.9
Journal of Business Research	22	10.5
IEEE Transactions on Engineering Management	15	4.6
Business Horizons	14	5.8
Industrial Marketing Management	9	7.8
Electronic Markets	6	7.1
Journal of Organizational and End-User Computing	6	3.6
Management Decision	6	4.1
MIS Quarterly	5	7.0
Small Business Economics	5	6.5
Technovation	5	11.1

Table 2. Study sample papers (Top 5 cited).

Title	Author(s)	Journal	Main findings
Artificial Intelligence in Service	Huang, MH; Rust, RT	*Journal of Service Research*	AI is reshaping the service industry by gradually replacing service tasks from low-level to high-level, which both drives innovation and threatens human employment,

			especially as AI evolves to be able to perform more complex tasks and human "soft" skills become more important.
Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence	Kaplan, A; Haenlein, M	*Business Horizons*	AI needs to be understood With respect to evolutionary stage or system type, and its potential impacts and risks to universities, enterprises, and governments are explored. Finally, a three-element framework of trust, change, and control is proposed to guide organizations in dealing with the internal and external impacts of AI.
Cobots in knowledge work Human - AI collaboration in managerial professions	Sowa, K; Przegalinska, A and Ciechanowski, L	*Journal of Business Research*	The study found that the collaboration between human workers and artificial intelligence in management tasks can effectively improve productivity, emphasizing the collaborative model of close cooperation between human and artificial intelligence in future knowledge work rather than complete automation.
Collaborative intelligence: How human and artificial intelligence create value along the B2B sales funnel	Paschen, J; Wilson, M; Ferreira, JJ	*Business Horizons*	This paper explores how artificial intelligence (AI) is making a significant impact in the B2B sales process with the help of advances in information and communication technologies, particularly in transforming data into knowledge to facilitate knowledge creation and management.
Machine learning and AI in marketing - Connecting computing power to human insights	Ma, LY; Sun, BH	*International Journal of Research in Marketing*	The paper calls for marketing research to utilize machine learning methods, Outlines common machine learning tasks and methods, and compares them with traditionally used statistical and econometric methods, proposing a unified conceptual framework and a multifaceted research agenda to further exploit the potential of machine learning methods in marketing.

3.2. Most Influential Institutions and Countries

We used CiteSpace to obtain information on high-productivity institutions, centrality and geographical location of research on digital transformation in firms (Table 3). In this article, we used the CiteSpace to construct an academic citation network and calculated the number of citations and centrality for each institution. The number of citations (Recs) represents the frequency at which an institution's research outputs are cited by other scholars, reflecting the institution's academic influence; Centrality in literature analysis reveals the hot spots, trends, and core researchers in a research field by calculating and analyzing the centrality of keywords, authors, and institutions, etc. With respect to Recs, the most productive institutions are the University of London, the IIM System (Indian Institute of Management), and the University of St Gallen. With respect to Centrality, the top institutions have established extensive partnerships with other institutions and become key nodes in the academic network. In particular, Swansea University and the IIM System (Indian Institute of Management) have the highest degree of centrality, indicating that they play an important role in the academic network. With respect to geography, the

main countries for Recs and Centrality are the United States, the United Kingdom, and India. By comparing the top 10 institutions in Recs and Centrality, we find that the IIM System (Indian Institute of Management) has a high output of publications and is an important research institution in human-AI collaboration.

Table 3. Top 10 institutions among 113 institutions ranked by Recs and Degree.

Recs	Institution	Country	Centrality	Institution	Country
10	University of London	Britain	0.2	Swansea University	Britain
9	Indian Institute of Management (IIM System)	India	0.18	Indian Institute of Management (IIM System)	India
7	University of St Gallen	Switzerland	0.18	University System of Georgia	America
6	University System of Ohio	America	0.18	Indian Institute of Management Nagpur	India
6	Swansea University	Britain	0.17	University of Southern California	America
6	University System of Georgia	America	0.17	Symbiosis Institute of Business Management (SIBM) Pune	India
5	Pennsylvania Commonwealth System of Higher Education (PCSHE)	America	0.17	Cardiff University	Britain
5	Royal Institute of Technology	Britain	0.16	National University of Singapore	Singapore
4	University of Southern California	America	0.16	CNRS - Institute for Humanities & Social Sciences (INSHS)	France
4	University of Vaasa	America	0.13	University of Vaasa	America

To understand the role of different countries in human-AI collaboration research, we analysed the countries of publication of the literature using CiteSpace and obtained the high-yield countries and their centrality, as shown in Figure 2.

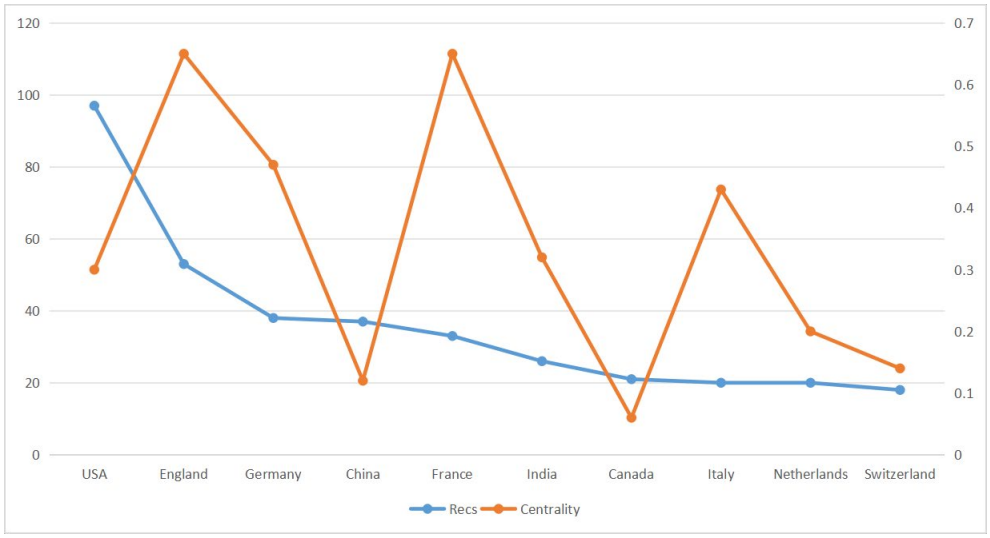

Figure 2. The most influential countries of 30 countries ranked by Recs and centrality.

With respect to Recs, the US has the most papers in the area of people and AI research in organizations with 97 existing publications, followed by Germany, the UK, China, and so on. The United States ranks first in the number of publications, which may be because it started research in AI earlier than other countries. America's national strategic plan for the artificial intelligence development in 2019 and 2023 all have important updates and releases, this strategic planning for the development of the United States in artificial intelligence provides a clear direction. In terms of centrality, nodes with a centrality greater than 0.1 are critical nodes, and critical nodes are usually considered to have the potential to trigger changes in the research area. All of the top 10 countries are located at major hubs, suggesting that these countries are in an important position to drive development in this area.

4. Bibliometric Analysis

4.1. HistCite Citation Mapping

Citations were visualized through HistCite, and the citation map is shown in Figure 3. Each node in the figure represents a document, and the larger the size of the node, the more times the document is cited. The number in the node is the document number automatically generated by the system. The node pointed by the arrow represents other documents cited by a document in the database. In recent years in the organization of people with AI research with technical constantly breakthroughs, and between various research also has a strong relationship with cross reference. Figure 3 clearly illustrates the focus of the research on human-AI collaboration in organizations in the past few years. At the same time, the ethical and legal issues surrounding AI are also the focus of scholars. With the rapid development of the digital economy, intelligent machines are infiltrating the workplace and society, human and intelligent machines have experienced from the man-machine coexistence and cooperation to the human-AI collaboration.

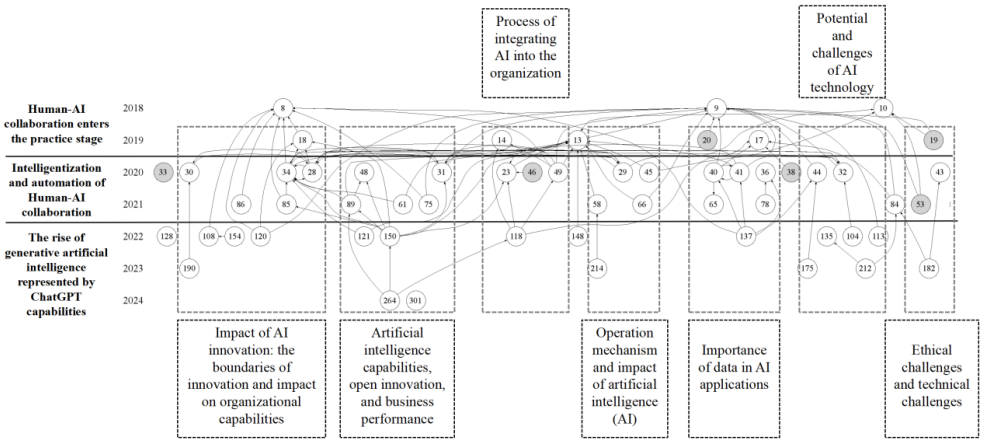

Figure 3. HistCite citation mapping on Human-AI Collaboration (TOP 60).

Since the middle of the 20th century, the development of AI LLM has gone through multiple stages. From the 1950s to the 1970s, artificial intelligence began to germinate, and researchers proposed many basic concepts and algorithms, such as logical reasoning and expert systems. In the 1980s and 1990s, neural networks received renewed attention, and technologies such as deep learning gradually developed. In the early 21st century, with the popularization of the Internet and the explosive growth of data, the development of big data technology provides the basis for the training of large AI models. In the early 2010s, breakthroughs were made in deep learning technology, such as convolutional neural network (CNN) and recurrent neural network (RNN), which laid a foundation for the development of large artificial intelligence models. However, as the latest generation of AI large model, GPT3.5 came out in 2021, with more powerful language understanding and generation capabilities, and is widely used in natural language processing, dialogue systems and other fields. Artificial intelligence model development has experienced several stages, from the basis of early research to today's highly intelligent, constantly promoting the development and application of artificial intelligence technology. In addition, generative AI has significant differences and advantages over traditional AI, such as powerful data processing capabilities, creative output, and more natural interaction with humans. These advantages make generative AI have broad application prospects in various fields.

4.2. Industry 4.0: Human-AI Collaboration Enters the Practice Stage

The fourth Industrial Revolution will partially transfer decision-making power from humans to computers, and realize the automation and optimization of decision-making processes through emerging technologies [25]. Human-machine collaboration not only promotes the change of organizational management practice but also increasingly becomes an important field of organizational behavior and human resource management research. In theory, human-machine collaboration provides a new research background and approach for interpersonal relationships, leadership styles, work performance, and identity in organizations. In addition, several studies have begun to explore how human-machine collaboration affects employees, managers, and companies from an organizational lens [26]. So far, no research has established a theoretical basis for human-AI collaboration in organizations [18], which also concludes through systematic bibliometric analysis that the current research on human-machine collaboration in organizations mainly focuses on the impact of the introduction of this working mode on employee innovation and performance, which also indicates that many studies have explored the impact of the introduction of artificial intelligence and technology on organizational performance. Analyze the role of innovation in human-machine collaboration, the impact of human-machine collaboration on human resource management, and analyze the role of IT

in human-machine collaboration. At the organizational level, some studies have noted that the impact of human-machine collaboration on organizations is mixed. On the one hand, when organizations adopt human-machine collaboration, the most direct impact is to reduce organizational costs and improve work efficiency, reduce organizational risks [27], and promote fair decision-making [26].

Studies have found that more human-machine collaboration can help companies improve service quality and gain market share [28,29]. In addition, the introduction of AI encourages teamwork and coordination within work teams [30]. Introducing AI, on the other hand, organizations will increase the complexity and uncertainty of the environment [27], and change the working dynamic [31,32]. From the employee perspective, human-machine collaboration can improve job satisfaction and reduce turnover. The introduction of machines also improves the work skills and efficiency of employees [15,24]. As a new working mode, human-machine collaboration helps to improve employees' innovative spirit and learning behavior [30] and helps to improve work engagement and promote knowledge sharing among employees [18,33]. On the other hand, some studies also emphasize that more attention should be paid to the negative impact on employees while introducing artificial intelligence.

AI and people working together mechanism will lead to more efficient teamwork and innovation, artificial intelligence, can undertake the task of some repeatability and low value, releasing more innovative and strategic HR work. The collaborative working mechanism between AI and people can also promote organizational change and cultural innovation in enterprises. By introducing AI technology, enterprises can establish a more flexible and open organizational structure and promote knowledge sharing and cross-department cooperation. This mechanism can stimulate the innovation potential of employees and promote enterprises to achieve more rapid product and service innovation, to enhance the competitiveness and market position of enterprises.

4.3. Industry 5.0: Intelligentization and Automation of Human-AI

The Fifth Industrial Revolution (5IR) focuses on harmonious human-machine collaboration and puts the well-being of multiple stakeholders, including society, the company, employees, and customers, at the center [34]. Discussion of the present situation of artificial intelligence around the work of the individual worker, team, and organization comprehensive and systematic discussion about the influence of [1]. At the same time, there is also a lack of comprehensive discussion on how AI can (re) configure work routines, workflows, and practical skills [14] and how workers perceive and react to these changes [35]. Through a systematic review of empirical studies, at the individual, group, and organizational levels, there are studies on topics related to human-AI collaboration, human and algorithmic capabilities, human workers' attitudes and experiences with AI and algorithm management, and the impact of AI on the labor market [11]. At the same time, in the era of artificial intelligence (AI), enterprises are paying increasingly attention to the role of AI in innovation. 93% of North American and European manufacturing companies view AI as a key factor driving technological innovation [23]. Research has pointed out that the main goal of SMEs as innovation intermediaries is to adopt AI-driven tools to help these organizations gain and maintain competitive advantages in the ever-evolving, ambiguous, dynamic, and turbulent business environment by conceptualizing new practices, optimizing existing processes and strategically aligning them with business needs [7,36]. Related research findings suggest that AI (as a technological innovation) provides organizations with the ability to make dynamic decisions, which will help to flexibly reconfigure business processes and "anytime, anywhere" (i.e., meet current needs while avoiding disruptions), and will lead to the development of resilient organizational supply chains, These supply chains are also sustainable [37].

Human and technical cooperation in multiple fields shows its great potential and value, this is the fifth industrial revolution (IR), and the pursuit of the principle of harmonious human-machine collaborative vision is highly consistent [34]. Especially in healthcare and retail services, the practice of human-machine collaboration not only optimizes workflow but also significantly improves service quality and customer experience [34,35]. In the retail service front line, the human-machine collaboration between artificial intelligence and employees also shows its unique advantages. Artificial intelligence systems can process large amounts of data and provide a personalized recommendations and services to customers, while employees can use their professional knowledge and interpersonal skills to provide customers with more considerate and personalized services [38]. This human-machine collaboration model not only improves the efficiency of retail services but also enhances the emotional connection between customers and brands [39]. As AI takes on more tasks, employees should focus more on engagement in empathy and emotional tasks, as these are areas where AI isn't good at yet. This division of labor will enable human and artificial intelligence to give full play to their respective advantages in their respective fields and jointly provide customers with better services [40]. Opportunity identification is the starting point of product development and the key to determining whether a new product can accurately meet the needs of users. In the digital economy environment, user scenarios are becoming increasingly fragmented and demand is becoming increasingly variable. To cope with this challenge, enterprises need to conduct real-time data analysis and scene judgment and make predictions and decisions quickly. By combining human cognitive advantages with AI algorithmic advantages, they can constantly discover and create new user needs and continuously develop innovation opportunities.

4.4. Industry 5.0: Generative Artificial Intelligence Represented by ChatGPT

ChatGPT just generates type artificial intelligence (GAI) an example of an application, GAI refers to a kind of can generate text, images, audio, video, code, and synthetic data of artificial intelligence (AI) [6,39]. There is widespread agreement that we are entering a new era that will revolutionize the way we access information, generate content, cater to consumer needs, and run businesses [24]. In marketing, consumer engagement with AI technologies, especially those capable of performing tasks without human intervention (e.g., generating or predicting AI; [36]) has received extensive attention in the consumer psychology and marketing literature [18,26]. Consumer engagement (CE) is becoming increasingly popular in the context of artificial intelligence (AI-based) technologies (for example, chatbots, smart products, voice assistants, or autonomous cars) [41]. Some scholars have come up with three main themes of AI-based CE, including (i) increasingly accurate service delivery through AI-based CE; (ii) the ability of AI-based CE to (jointly) create consumer perceived value, and (iii) AI-based CE reduces consumer effort when performing tasks [41]. At the same time, AI can also provide personalized services and products to help enterprises better meet customer needs, thus promoting marketing innovation and customer experience improvement [39].

With the advent and utilization of generative AI, traditional content creation is likely to be enhanced and transformed in several ways. The literature on content marketing and social media content [42-44] typically focus on the content creation process, the digital platform on which the content is distributed, and how the content affects customer engagement. Following this convention, existing research proposes a research agenda on the use and impact of generative AI in content marketing, focusing on three important aspects of content creation, digital platforms, and customer engagement [44]. In addition, the research on the process mechanism of the impact of human-AI collaboration on enterprises is also carried out based on a specific scenario [37]. For example, the research on human-AI collaboration in product innovation is relatively new, and scholars have paid attention to this field and carried out research on human-AI collaboration innovation since 2020. A

business research circle centered on artificial intelligence was formed. Since then, the academic community has also carried out research on creative industry, technology empowerment, product innovation, and other fields. Current research focuses on big data, AI, and other digital technologies as auxiliary tools for product innovation, pointing out that digital technology can help enterprises obtain user information with low cost and high efficiency, conduct data analysis, provide technical conditions for continuous product improvement, and make products gradually evolve from difficult to change form and function to be able to make immediate adjustment according to the changes of user needs. Enhancing the match between products and user needs [35,45-47].

GAI is considered a breakthrough in accelerating AI technology due to its ease of use, intuitive interface, and superior performance. This technological innovation provides new possibilities for firms, thereby driving innovation in business models. Firms can use GAI to create new services, and products or improve existing processes to better meet customer needs.

4.5. Keyword Co-Occurrence and Emergent Analysis Using CiteSpace

Previously published articles are cited more, resulting in the HistCite citation map not accurately showing the latest research trends. Therefore, in our artical, we use CiteSpace for further analysis. In this article, by using CiteSpace for keyword emergence and co-occurrence analysis, we can more accurately understand the latest research trends in the current academic field. We used CiteSpace to map the keyword co-occurrence in the sample literature (Figure 4). This analytical approach can not only reveal emerging research hotspots and directions but also help us understand the relationship and mutual influence between different research topics. Keyword co-occurrence analysis is mainly based on the statistical analysis of the frequency of high-frequency keywords in the same article to generate a co-citation matrix. Therefore, this paper uses CiteSpace to analyze the keyword co-occurrence in the literature on human-AI collaboration in organizations, and obtains the keyword co-occurrence network map as shown in the figure below.

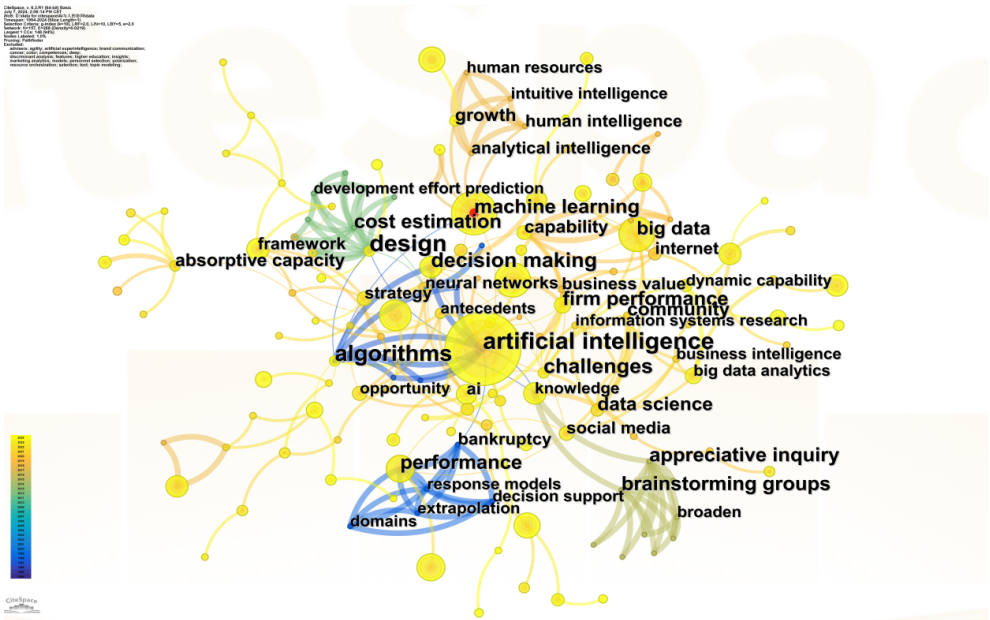

Figure 4. Human-AI Collaboration keyword co-occurrence mapping.

According to CiteSpace, keywords with more than 20 frequencies include artificial intelligence, machine learning, big data, management, technology, performance, knowledge, decision-making, innovation, framework, information technology, models,

systems, strategy, and capabilities. These 15 keywords constitute the foundational framework of the knowledge network pertinent to human-AI collaboration research within organizational contexts, embodying the quintessential research foci within this academic domain. These 15 words can be summarized into five main research aspects of human-AI collaboration in organizations: technology convergence and intelligence enhancement, management strategy and performance optimization, knowledge management and decision support, innovation and change management, and framework construction and system integration. Keywords with co-occurrence network centrality greater than 0.1 include Algorithm, decision-making, artificial intelligence, machine learning, knowledge, design, big data, social media, company performance, challenge, open innovation, framework, strategy, bias, technology, capability, absorptive capacity, exploration, dynamic capability, automation, and opportunity, these 21 keywords cover the causes, processes, and outcomes of digital transformation and are the issues that must be explored in this field. We further refine these 21 keywords into antecedents, processes and outcomes. Among them, algorithms, artificial intelligence, machine learning, big data, technology, challenge, open innovation and social media belong to antecedents, while decision-making, design, framework, strategy, knowledge, capabilities (such as absorptive capacity and dynamic capacity) and exploration constitute process factors. Firm performance, opportunity, and bias represent the outcome factors. In the keyword burst analysis, it is found that academic research in machine learning began to surge in 2018, and this trend eased slightly in 2020, which also laid a foundation for the emergence of generative AI which emerged suddenly in 2021. Generative AI learns the distribution and abstract concepts of data through machine learning algorithms to generate new data, and generative AI combines a variety of machine learning techniques, such as deep learning, generative adversarial networks (GANs), variational autoencoder (VAE), etc., to achieve its unique generation ability [9] [48]. With recent innovations in generative adversarial networks (GANs), AI can now be used to generate highly realistic works of art, music, etc. [10].

5. Discussion

The study of human-AI collaboration in organizations holds significant value, with technology serving as the fundamental cornerstone of human-AI synergy, thereby underpinning both the theoretical research and practical applications within this domain. In this process, the human-AI collaborative system in the organization is an important factor in determining enterprise performance. In addition, the existing literature shows that there is a strong mediating relationship between the dynamic capabilities of an organization and the organizational performance brought by human-machine collaboration, and there is a moderating relationship between the degree of knowledge sharing among employees and the degree of proximity between human beings and artificial intelligence in work and the organizational performance brought by human-machine collaboration [49]. In the next subsection, we discuss the concept of these four elements and their impact on human-AI synergy performance in organizations. On this basis, we will construct a conceptual framework that can provide guidance for the results of human-AI collaboration in organizations and also provide ideas for future research on human-AI collaboration.

5.1. Human-AI Collaborative System

Artificial intelligence (AI) is driving businesses to redesign their innovation processes. The proliferation of digital technologies increasingly emphasizes service innovation, business models, and interactive customer relationships [50,51]. Compared with other digital technologies, artificial intelligence enables computer systems to simulate intelligent human behaviors, subverting the traditional way of operation and innovation of companies [32]. Some scholars believe that AI is a collection of technical, mathematical, and statistical models and diverse data that is widely used in a variety of applications that simulate or exceed human intelligence. From the perspective of the information system (IS) discipline,

AI specifically refers to the ability of robots to imitate the cognitive mode of the human brain and execute human-like instructions, which covers aspects such as perception, knowledge acquisition, interaction with the environment to make decisions, and even display creativity [37]. Human-machine collaboration is the collaboration between humans and AI, robots, and algorithms [30]. Existing research, however, does not unilateral attention to artificial intelligence ability, turning to scholars' research and AI research collaboration systems, especially in the artificial intelligence to generate content rise stage (AIGC) technology. How to use human professional judgment ability and AI's powerful data learning ability to empower enterprise work efficiency is the future research trend of intelligent collaboration systems. As an emerging content generation method, AIGC has creative generation characteristics and essentially promotes the knowledge-creation process [52]. Human and AI will provide vastly different complementary capabilities and qualities that will improve business performance [8]. The importance of collaborative intelligence lies in the fact that it constructs an efficient, complementary partnership between artificial intelligence (AI) systems and human workers to jointly drive the realization of organizational value. The core of this system is to integrate the intelligent advantages of AI with the unique capabilities of human workers to create outcomes beyond what can be achieved by a single entity [53]. Although organizations recognize the potential benefits of adopting AI, they are not effectively augmenting human intelligence or replacing employees with AI expert systems [14]. This phenomenon can be attributed to the limited knowledge, skills, and understanding of the workforce (including employees and managers) regarding the capabilities, limitations, strategic plans, and integration with existing business processes of AI [9]. If employees (human workers) understand, trust, and adopt AI [17,36], the potential benefits of AI-employee collaboration established through symbiotic partnerships can be fully realized in practice (beyond theoretical narratives) [8]. Possible roles of AI in teams, including coaches, innovators, and software developers, and the role and impact of AI in collaborative work.

5.2. Mediating Effects of Organizational Dynamic Capability

Dynamic capabilities are a fundamental concept for firms to gain competitive advantage. Over the past two decades, researchers have studied the impact of dynamic capabilities on an organization's business, financial, and innovation performance [33]. Dynamic capabilities are based on the resources of enterprises, that is, those precious, rare, difficult to imitate, and irreplaceable resources that give enterprises competitive advantages in the market [13]. The mainstream of dynamic capability research emphasizes how different levels of dynamic capabilities [23] transform and evolve into more complex levels of capabilities [54]. Dynamic capabilities theory emphasizes that organizations must cultivate dynamic capabilities that enable them to effectively identify, interpret, and learn from large amounts of data. With the investment and deployment of new digital technology innovation to quickly respond to market changes and competitive pressures [15]. AI can help organizations maximize the ability to sense, grasp, and reconfigure in an unpredictable environment, providing an optional technological capability for organizations to balance market response and internal coordination [27]. Through systematic reconfiguration of organizational processes, human resource skills, development of internal capabilities and resources, and redefinition of value propositions, an organization's ability to remain agile, responsive, flexible, and efficient in a variable and uncertain environment [8]. Scholars mentioned zero-level, first-level, and second-level dynamic capabilities. Zero-level dynamic capabilities mean increase their resource base through improvements in individual routines. First-level dynamic capabilities mean extend and modify resource-based advantages by updating dynamic capabilities. Secondary dynamic capabilities refer to firms promoting strategic change by transforming their resource base. Dynamic capabilities are essential for companies to implement sustainability strategies and sustainable

business models. It requires enterprises to have more comprehensive and complex innovation management, production, and manufacturing capabilities, as well as cross-stakeholder management and participation capabilities, and dynamic capabilities will significantly affect business performance [8,51].

5.3. Moderating Effects of Knowledge Sharing

AI knowledge is constantly evolving, and once documented as an experiential knowledge base, it can be shared among employees, which will affect how organizations dynamically adapt to, adopt, and manage turbulent changes in technology [19,53]. Thus, organizations will remain responsive and agile in developing internal resources and processes to meet employee expectations, consumer needs, market needs, and compliance with regulations. Knowledge sharing and dissemination within organizations will improve employees' AI skills and clarify the nature of work in AI-human collaborative work environments[8]. Knowledge sharing within the organization is crucial to the effective development of collaborative intelligence, which facilitates knowledge integration and co-creation, thus enhancing the dynamic capabilities of the organization [41]. Knowledge sharing is closely related to people's understanding of the concept, use, and strategic initiatives of artificial intelligence (AI). Knowledge sharing and a better understanding of AI systems help to improve the digital readiness and adaptability of human resources. At the same time, knowledge sharing and skills development enable employees to better understand the meaning of work design and work. Improve employees' task mastery ability in an AI-employee collaborative working environment and balance interdependence, autonomous social hierarchy, and employee expectations in AI-human collaborative working environment [14]. These views show that knowledge sharing in promoting collaboration with AI plays a key role, and the dynamic capability of the organization and business performance has a positive impact.

5.4. Moderating Effects of Human Proximity to Artificial Intelligence at Work

Artificial intelligence and human proximity in their environment, respectively is without contact, indirect contact, cooperation, and integration [7], the proximity on behalf of the artificial intelligence and human in different environment interaction and cooperation modes. In addition, Dwivedi proposed that the different levels of proximity between human and artificial intelligence (AI) in work include direct interaction, supervision and assistance, independent operation, collaborative decision-making, task delegation, and continuous learning, and believed that the concept of collaborative work was redefined to include not only the continuity between physical and virtual [37]. More extended to humans and humans, and between dual cooperative relations between humans and artificial intelligence. Machines focus on tasks such as complex calculations and large amounts of data processing, while humans focus on areas such as complex decision-making, and social and emotional skills [24]. There are situations where AI requires human guidance because machines lack enough data to make correct predictions and decisions [22]. Kruse, Dmitriyev, & Gomez mentioned the concept of "centaur," in which artificial intelligence becomes an extension of the human brain and the two sides achieve full cooperation [9]. Sowa et al. found that participants with virtual assistants showed 57% higher productivity in management tasks than those without assistants, indicating that collaboration between humans and artificial intelligence can significantly improve work efficiency [6]. Furthermore, collaboration between humans and AI can lead to higher subjective performance evaluations, with participants increasing their productivity evaluations by 42% in follow-up surveys. Therefore, the collaboration between humans and AI not only improves work efficiency but also helps improve work performance.

5.5. A Conceptual Framework for AIGC-Integrated Human-AI Collaboration

Artificial intelligence (AI) is different from other technology adoption processes in that it requires AI adopters to consider cognitive, relational, and structural complexities [5]. Through the study of artificial intelligence technology's impact on corporate performance and special emphasis on the banking industry, instructions will be included in the artificial intelligence in big companies' real advantages, such as improved labor productivity and significant cost savings [5]. It can be argued that AI plays an important role in the innovation process by supporting creativity and out-of-the-box thinking [21]. Machine learning has confirmed that content, contributors, and people are the most helpful for generating ideas in a company's product innovation process [28]. The importance of machine learning as an appropriate tool for online communities to predict new product ideas [16]. In the era of the digital economy, users' demands have become increasingly diversified, personalized and scene-specific, and different users have differentiated demands for product functions and experiences, which makes product innovation face unprecedented challenges [24]. However, the rapid development of AI provides important technical support for enterprises to comprehensively obtain and analyze user information. Compared with humans, AI's superior computing power can process more data and deduce causal relationships and significant patterns from massive data [16]. The collaboration between humans and AI and AI technology will have an important impact on society, enterprises, and individuals. In the future, it is necessary to improve the application of AI technology in various scenarios to better meet the application of multi-scenarios in the era of artificial intelligence [6].

GAI has proven to be an effective resource that can significantly increase employee productivity in a range of professional areas. As AI gets involved in teams, the way humans interact is likely to change. AI's involvement may influence the communication between team members, the decision-making process, and the work way to be assigned. Team members may need to adapt to new ways of working with AI, including learning how to communicate and collaborate effectively with AI. This change may require rethinking how teams collaborate and communicate to ensure that teams can operate efficiently and succeed in a hybrid human-AI environment. Therefore, attention needs to be paid to changes in team dynamics and interpersonal relationships, and new strategies and methods may need to be developed to adapt to the working environment of hybrid human-AI teams. Human beings need to develop new methods and strategies to adapt to human and artificial intelligence (AI) working together, which causes problems in research. These include how to allocate tasks and coordinate work effectively, and whether humans will feel the same sense of accomplishment when AI does most of the creative work. The interaction between humans may change in hybrid teams, and the team collaboration and communication methods need to be rethought. These issues highlight the challenges and opportunities brought by the collaborative work between humans and AI, which need further research and discussion to promote effective cooperation and synergy. Figure 5 shows a conceptual framework for GAI-based human-AI collaboration.

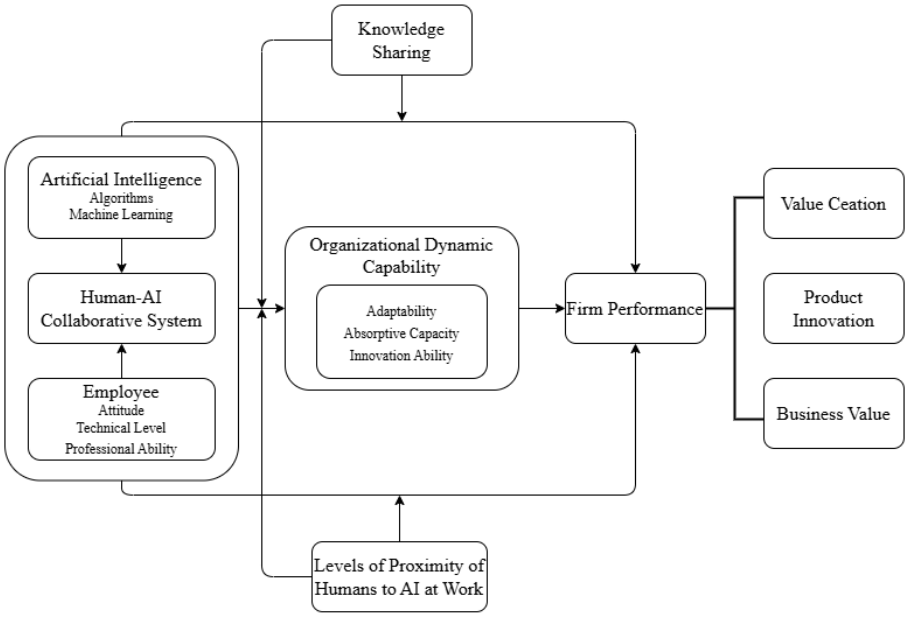

Figure 5. A Conceptual Framework for GAI-based Human-AI Collaboration.

6. Conclusion

Our review provides an in-depth analysis of the impact of GAI in these areas, with results obtained from 305 publications in Web of Science sources. Based on the research on the relevant literature on human-AI collaboration, our study summarizes the AI technology, the process mechanism of human-AI collaboration, and the impact of this mechanism on enterprise innovation performance, marketing innovation and value innovation. Despite previous literature reviews on this topic, our literature summarizes the impact of GAI technology on the organizational level and introduces it into the conceptual model to provide theoretical support for improving the organization's utilization of learning GAI technology.

With the rapid development of AI technology, increasingly organizations are beginning to apply AI to their business operations and decision-making processes. However, the application of AI does not simply replace humans, but instead learns and collaborates with humans to achieve better business outcomes. AI technology application in enterprises has become a trend, and the working mechanism of AI and personal performance of enterprise innovation, marketing innovation, and value innovation have an important influence.AI technology can improve the production efficiency and innovation ability of enterprises through automation and intelligence. AI assists employees in processing large amounts of data and analyzing them, helping enterprises discover potential trends and opportunities, thus guiding enterprises' innovation activities and helping enterprises better respond to market changes and competitive pressures. Studies have also confirmed that the collaborative working mechanism between AI and human beings has promoted organizational change and cultural innovation in enterprises. By introducing AI technologies, companies can build more flexible and open organizational structures that facilitate knowledge sharing and cross-sectoral collaboration. This mechanism can stimulate the innovation potential of employees and promote enterprises to achieve more rapid product and service innovation, to enhance the competitiveness and market position of enterprises. A new round of technological revolution and industrial revolution is accelerating to promote organization intelligent processes. Big data, cloud computing, and emerging technologies such as artificial intelligence constantly updated iteration is upending traditional organization structures, management models, and value creation logic. At present, the government emphasizes the deep integration of the Internet, big data, artificial intelli-

gence, and other technologies with various industries, and gives full play to the application of artificial intelligence. As human-computer Interaction Technology in all fields of penetration, human-AI collaboration become a development trend and Human-machine collaborative decision making is no longer restricted by cognitive ability. The collaborative model can give full play to their respective advantages, to produce more informed decisions, to better achieve organizational tasks. So it is necessary from the human-computer interaction and the social network perspective, to explore to adapt to the digital economy and intelligent manufacturing of a new type of organization form, the organization's overall consideration in the design of the relationship between man and machine, reconstruct the new man-machine relationship, reduce the uncertainty in the process of decision-making and release greater productivity, and to keep the organization continued competitiveness, improve the organizational dynamic capabilities.

GAI integration in various organizations marked the digital transformation and creativity to enhance the major leap forward. Its applications in fields such as academia, engineering, and communications are revolutionizing ways to improve productivity at work, from creating compelling ads to quickly generating accurate technical reports. As a subfield of artificial intelligence, the GAI field, represented by ChatGPT, is rich in research content. While ChatGPT brings great convenience to society, it also brings legal risks, mainly including the legitimacy of data sources, intellectual property disputes, and the generation of bad or illegal information. The emergence of generative AI is a huge development opportunity, as long as it can be properly guided by good policies, it can enhance its strengths and avoid its weaknesses, so that the power of generative AI can be better played, and this new technology can better benefit the people. At the same time, the development of generative AI is bound to be accompanied by a process of "creative destruction," which will bring about technological unemployment, worsening income distribution, and monopolies and unfair competition. As generative artificial intelligence represented by ChatGPT has been widely used in translation, intelligent writing, publishing, natural language processing, coding, and other fields with powerful content creation technology, embracing the future, human-machine collaboration path exploration is a breakthrough solution. Here are some potential future research directions based on the current literature:

Human-AI Integration in Knowledge Management: Further investigation into how human-AI collaboration influences knowledge sharing and decision-making in organizations. Research could explore frameworks that better integrate AI into organizational processes while maintaining human oversight and involvement.

AI's Impact on Organizational Innovation: Delving into how AI can contribute to product and service innovation through better alignment of business strategies, dynamic capabilities, and technological adoption cludes exploring the intersection of human creativity and AI's generative capabilities.

Exploring Generative AI's Role in Creative Industries: With the rise of generative AI tools like ChatGPT, research could focus on how these technologies reshape creativity and content generation across various industries, including advertising, media, and entertainment.

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